MSTP Pamphlet 4-0.1

Movement Control

MAGTF Staff Training Program
(MSTP)

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Movement Control

This pamphlet supports the academic curricula of the Marine Air Ground Task Force Staff Training Program (MSTP).

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UNITED STATES MARINE CORPS
MSTP Center (C 54) MCCDC
3300 Russell Road
Quantico, Virginia 22134-5069

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FOREWORD

1. PURPOSE. MSTP Pamphlet 4-0.1, *Movement Control* is designed to assist the commander and the staff officer in planning and executing movement control.

2. SCOPE. This pamphlet provides an overview of movement control and specific techniques for planning and executing movement control. While the pamphlet is primarily focused at the Marine expeditionary force (MEF) level, these techniques may be used by commanders and staffs at Marine Corps component and major subordinate commands.

3. SUPERSESSION. None

4. CHANGES. Recommendations for improvements to this pamphlet are encouraged from commands as well as from individuals. The attached User Suggestion Form can be reproduced and forwarded to:

Commanding General (C 54)
3300 Russell Road
Marine Corps Combat Development Command
Quantico, Virginia 22134-5001

Recommendations may also be submitted electronically to:
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5. CERTIFICATION. Reviewed and approved this date.

D.R. AHLE
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Throughout this pamphlet, masculine nouns and pronouns are used for the sake of simplicity. Except where otherwise noted, these nouns and pronouns apply to either sex.

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Part I

Movement Control

The success of military operations often depends on sound and timely deployment and logistical support. An efficient and effective transportation system for the movement of troops, equipment and supplies is essential to rapid deployment and the support of forces. Transportation systems consist of sea, ground, and air transportation modes of operations, terminal operations such as ports and airfields, and movement control. Movement control is the most critical part of a transportation system as inadequate control of logistic movement results in waste, reduced efficiency, and loss of combat power. Movement control is the planning, routing, scheduling, and control of personnel and cargo movements over lines of communication (LOCs) (Joint Pub 1-02). It also consists of validating movement requirements, allocating resources, coordinating movements, and force tracking of personnel and cargo during movement. Movement control balances requirements against capabilities and assigns resources based on the commander's priorities.

Effective movement control can mean the difference between victory and defeat. Failure to adequately govern the movement of various Confederate corps and divisions under General Joseph Johnston cost the Confederates a superb opportunity to defeat General George McClellan's Army of the Potomac in detail at the Battle of Seven Pines in 1862. Johnston's failure to ensure that his movement plan was fully understood by his subordinate corps and division commanders resulted in a disjointed and ineffectual attack that allowed an exposed Union corps to escape destruction.

Conversely, the skilled application of movement control by U.S. Central Command during the Persian Gulf War allowed the rapid movement of multiple corps-sized units and their logistic support from positions hundreds of miles away into attack positions along the Kuwaiti and Iraqi borders. Once across the line of departure, disciplined theater and subordinate command movement control resulted in the successful exploitation of limited LOCs to move and support coalition forces during offensive combat operations and retrograde back into Saudi Arabia.

1001. Principles of Movement Control

The six movement control principles must be utilized in the planning and execution of movement control operations in order to support the commander's mission, intent and priorities of movement. These principles are discussed below.

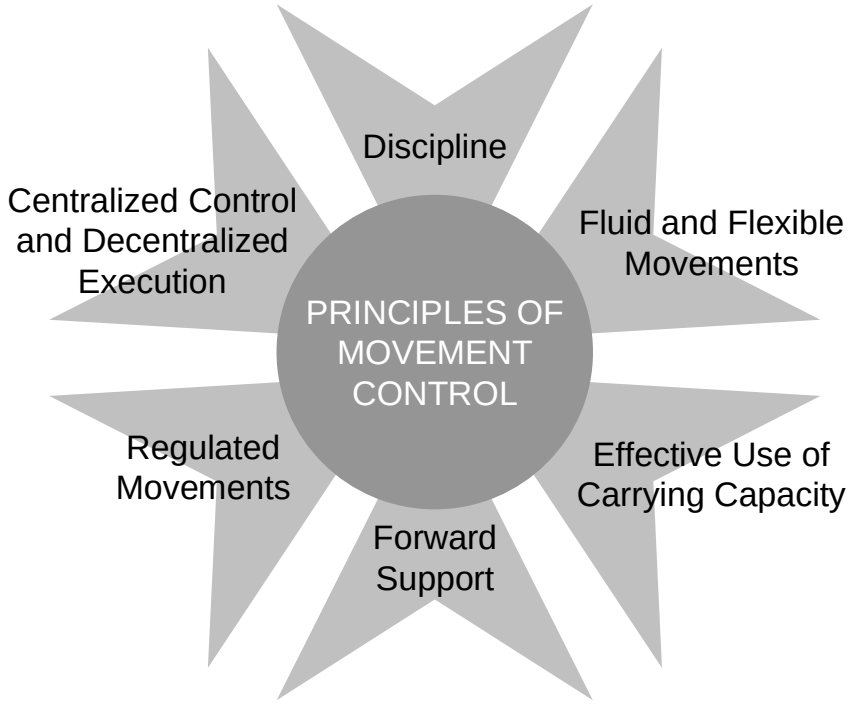

Figure 1-1. Principles of movement control.

a. Centralized Control and Decentralized Execution

Normally, the most efficient method to provide movement control is to centralize control of movements at the highest level. Centralization means that a focal point for transportation planning and resource allocation exists at each level of command involved in an operation. The focal point is an individual or unit that is aware of the current and future requirements of the supported force as well as the capabilities available to meet the requirements. Centralization of movement control normally occurs at the levels charged

with integrating logistics support. Decentralized control and execution of mode and terminal operations is equally important. Decentralized execution of transportation missions means terminal and mode operators remain free to assign and control the specific transportation assets that will meet the requirement. This practice enhances the flexibility to prioritize support and accomplish the mission.

b. Regulated Movements

Movement control authorities regulate moves to prevent transportation terminal and main supply route (MSR) congestion and scheduling conflicts among commands. Proper management of transportation assets and the transportation network is critical. Advances in technology have increased both the capability and requirement to regulate movements. Highly mobile forces, longer distances, increased consumption rates, and shared LOCs are a few of the challenges. The regulation of movements has two applications. One deals with the apportionment of cargo carrying capacities to movement requirements. The second deals with the regulation of traffic along MSRs. Transportation planners, in conjunction with the G-3 determine which traffic and LOCs require control during the planning process. Regulation of movements requires a comprehensive movement control plan as well as the assets needed to enforce the plan. The free flow of goods and services will not occur within a saturated transportation system in which demands for transportation exceed the system's capabilities. This saturation of the system normally occurs because highly mobile forces extend supply lines. Increased consumption rates and a desire to reduce stockpiles are additional causes of saturation of the transportation system. Movement controllers must therefore regulate movements and execute the commander's priorities for use of all available transportation modes and assets available. Inadequate transportation capabilities in relationship to the size of the force supported will also require prioritization.

c. Fluid and Flexible Movements

Transportation systems must provide the uninterrupted movement of personnel, supplies, and services. This means the system must be capable of rerouting and diverting traffic. Maintaining flexibility is one of the biggest challenges facing transportation planners and operators in a changing battlespace with shifting conditions and priorities. To accomplish this task successfully, the transportation system must be linked into the force's

command and control (C2) nodes and be able to communicate with various movement control agencies (MCAs). These systems provide timely data to adjust the responses of the terminals and modes in the system. Transportation planners and operators can also improve response time and flexibility by using the right modes for the right cargo. They can also anticipate the need for alternate modes and routes. For example, if a functioning rail system is available, movement of heavy equipment over long distances is best suited for movement over rail as opposed to highway if the tactical situation permits.

d. Effective Use of Carrying Capacity

Transportation is normally a limited asset. Therefore, planners must understand when to use a specific mode of transport and when to optimize the use of each mode's unique capabilities. This principle involves more than loading each transport vehicle to its maximum carrying capacity. It also means using all available transport capability in the most effective manner. While allowing for adequate equipment maintenance and personnel rest, transportation operators should keep transportation assets loaded and moving as much as the operational and tactical situation permits.

e. Discipline

The timely return of committed transportation assets from destination back into the system is an integral part of movement control. Transport vehicles and containers need fast off-loading and return to the system to increase the transport capability for follow on operations. Discipline is the prompt return of transportation assets that ensures their availability for subsequent operations. Similarly, transportation assets must support the retrograde of personnel and cargo operations.

f. Forward Support

Forward-oriented transportation support is a combat multiplier, as it enables the commander to concentrate the preponderance of his forces on the enemy. The principle of forward support includes fast, reliable transportation to provide support as far forward as possible. The key to forward support is the reception and clearance capabilities at the destination units. These units may require equipment and personnel augmentation to enhance their reception and clearance capabilities. Forward support may entail the provisioning of operational level transportation assets to support tactical level units.

However, any requirement for forward support that relinquishes centralized control for an extended time must be balanced against the effectiveness of the overall transportation system.

1002. Functions of Movement Control

The functions of movement control consist of planning, validating, allocating, routing, managing priorities, coordinating, and force tracking. See figure 2.

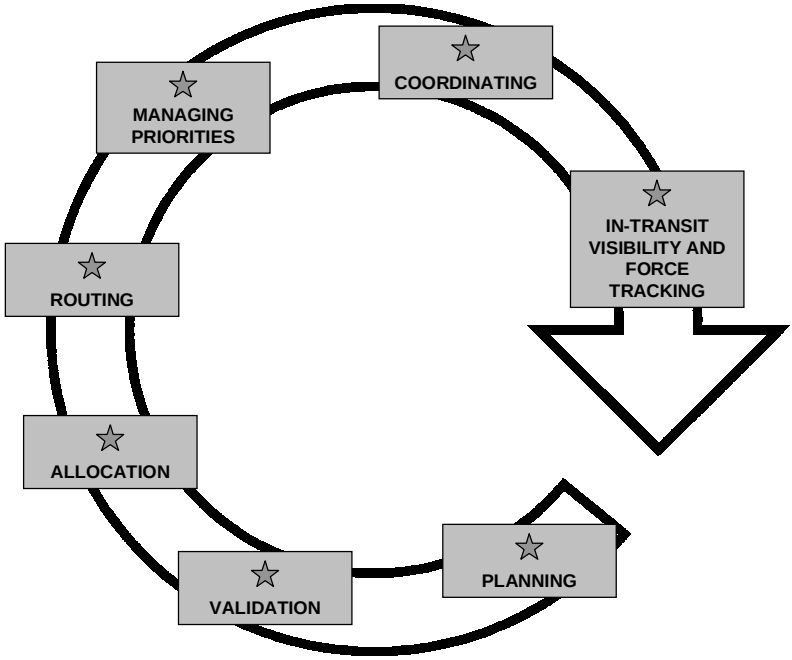

Figure 1-2. Functions of movement control.

a. Planning

Transportation planning is vital to the success of military operations at all levels of command. During course of action development transportation planners concurrently develop movement estimates for each course of action being considered. They advise commanders and staff on transportation

matters, coordinate transportation staff actions, and evaluate the effectiveness of the transportation system. They also coordinate with other functional planners that have an impact on transportation to ensure requirements relating to the transportation system are adequately covered. Because most facets of logistics interface with the transportation system and movement control, planners must look forward, backward, and laterally, as appropriate, to ensure plans are coordinated with supporting and supported commands.

b. Validating

Authorities within the requesting unit's chain of command must validate movement requests presented to an MCA. The validation confirms the need for the movement, shipment configuration, dimensions, and routing. This validation ensures that all parties, including the chain of command, are cognizant of the requirement.

c. Allocating

Allocating assigns specific transportation resources against planned movement requirements. It involves dividing the available transportation capability among the transportation tasks according to priorities. It is a critical function in decisionmaking because it forces planners to analyze all transportation tasks and in the broad sense, divide the transportation capabilities among those tasks.

d. Routing

Routing is the process of coordinating or directing movements on MSRs or alternate supply routes (ASRs). ASRs are routes designated for use when the MSRs are unavailable. When routing traffic, commanders and staffs should consider the fundamentals and principles that govern routing. See Part IV, Routing and Scheduling.

e. Managing Priorities

MCAs manage requirements and priorities when there are not enough assets to satisfy all transportation requests. They also regulate movement on LOCs to prevent conflict and congestion. This is called highway regulation for movement on roads. MCAs require access to command and control and automated support systems such as Global Transportation Network, Global Command and Control System, and Transportation Coordinator Automated

Information for Movement System, to process information in a timely manner.

f. Coordinating

MCAs are the customer's point of contact for transportation support and their point of entrance to the transportation system. They concentrate their efforts on those functions of movement control that directly relate to providing continuous transportation support. Coordinating is where MCAs interface with the receiving units and transportation units to provide transportation support. During this process, they match requirements with modes based on priorities and consider the principles of movement and mode selection criteria. MCAs then commit or task mode and terminal operators to provide support. Coordination extends to allied forces, the host nation (HN), and non-governmental agencies within the command's area of operations (AO). Reliable communications enhances response time and are crucial to this process. A standard transportation request process and validation system is inherent to coordination.

g. Force Tracking

Force tracking provides the location and status of forces and support units within the AO to the commander. It allows the commander to know when combat ready forces have completed arrival and assembly operations in their staging areas and when they are ready to deploy to their AO. This process begins in the staging area, where equipment and personnel are assembled into combat-ready units and continues until forces are ready to begin operations. Efficient movement control is an important means of force tracking. MCAs must be able to communicate force tracking data directly to operational commanders. They must have the communications, data processing equipment, and personnel assets to provide and manage force tracking data. MCAs use the established chain of command to facilitate effective and efficient movement control.

1003. Other Considerations

In addition to the basic principles and functions of movement control, the below considerations have a direct bearing on how movement control is conducted.

a. Range of Military Operations

To the maximum extent possible, commanders assign transportation responsibilities, establish procedures, train, and conduct operations using the same organizations throughout the range of military operations. Ideally, the transportation system used in peacetime should be the same system used during operational deployments. From a movement control perspective, the initiation of combat operations should only represent an increase in intensity, not a shift to new procedures and systems. Implementing this consideration is not simple.

b. Operational Deployments

An important consideration is identifying and sequencing transportation elements during operational deployments. This is crucial to the success of the operation. Movement control elements must arrive in the AO at the right time and with the right equipment to get the transportation system functional. Movement control elements should be among the early units deployed in the theater. Early deployment allows for the timely establishment of a transportation system with the capability to receive and program the onward movement of the deploying force and efficiently manage its growth.

c. Military Operations Other Than War

The primary effort in many military operations other than war is logistics. Transportation considerations include operating with international agencies, such as the United Nations, to support coalition forces and allies. Other considerations include working with personnel from non-governmental agencies and private organizations and developing HN capability to provide support. Movement control functions during stability and support operations are not materially different from those used during conflicts. Basic tasks and missions remain the same. These missions and tasks may take place under the direction of a joint force commander. The planning process at all command levels must involve transportation planners to determine the extent of transportation and movement requirements. Transportation planners can recommend the force structure needed to support a particular operation.

d. Nature of the Threat and the Theater of Operations

The principles of movement control are applicable regardless of the threat or geography, demographics, and organization of the theater of operation. Each

theater is confronted with its own unique set of challenges, because of varied world geography, when planning and establishing a transportation system and its associated movement control program.

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Part II

Movement Control Agencies

Transportation management and movement control should reside in the same organization, such as the force movement control center (FMCC) at the MEF G-4, logistics movement control center (LMCC) at the force service support group (FSSG) or unit movement control center (UMCC) at the unit level. These are collectively referred to as MCAs. Their peacetime functioning should mirror their wartime functioning. Some agencies, such as the FMCC and LMCC, are permanent organizations. Other MCAs, such as the UMCC formed by individual moving units, are temporary and may consist of no more than one or two individuals in the unit's S-4 section.

2001. Primary Staff (G-3/G-4)

a. G-3

The G-3 ensures that the movement control plan is integrated into the MEFs scheme of maneuver. The G-3 plans and directs the positioning and maneuver of combat and combat service support units within the MEF area. This may require rapidly projecting these forces over extended distances on MSRs. The G-3, coordinating with the G-4, establishes priorities for using MSRs for movement and maneuver. Maneuver will normally have priority over movement. However, maneuver must be well coordinated with movement to prevent route congestion, enforce movement priorities, and ensure continuous logistic support.

b. G-4

The G-4 develops logistic support plans and implements logistic support priorities for movement. The G-4 assists the G-3 in establishing priorities for use of MSRs. The G-4 plans and directs the support of the logistics units to support the command's movement control and transportation effort.

2002. Force Movement Control Center

The FMCC, operating under the cognizance of the G-4, coordinates with the G-3 during unit movement, force tracking, and maneuver planning. It assesses the impact for transportation requirements and highway regulation in the MEF area. The FMCC advises the G4 of logistics and unit movement requirements. This may include support of reception, staging, and onward movement of forces, replacement operations, and reconstitution. The FMCC assesses the overall effectiveness of the movement programs and recommends the type of transportation units and assets required to accomplish the MEF's mission. It coordinates with external elements for transportation support in excess of MEF capabilities. It normally includes both operations and logistics representation. The size and complexity of the MAGTF deployment determine the actual structure of the FMCC. The FMCC also—

- Plans transportation support, develops policies, provides guidance, and recommends movement priorities and procedures for movement control and highway regulation.
- Plans, coordinates, and oversees large or special movements in conjunction with the LMCC.
- Guides and assists major subordinate commands and units transiting the MEF area.
- Prepares, in conjunction with the LMCC, the transportation portion of the MEF plans and orders.
- Recommends road repair priorities and improvements for the road network in the MEF area in coordination with MEF engineers.
- Coordinates with the LMCC to implement traffic control and highway regulation plans.
- Coordinates with the civil affairs officer (CAO) and LMCC to plan for the movement of displaced civilians.
- Assesses and recommends requirements for host-nation support (HNS).
- Coordinates policy and procedures with the joint movement center (JMC) when the MEF is the Marine Corps component.

2003. Logistics Movement Control Center

The LMCC is the MEF's MCA and is activated by the FSSG when directed. The LMCC reports directly to the FMCC for matters concerning movement

control. It provides centralized movement control and highway regulation for moving personnel and materiel into, within, and out of the MEF area. It also ensures effective and efficient use of available transportation capability. It plans, programs, coordinates, manages, and analyzes transportation and movement requirements and implements MEF priorities. The LMCC performs transportation planning and highway regulation. It also controls, allocates, and supervises the operation of attached or assigned movement control teams (MCTs). The LMCC also does the following:

- Provides highway regulation planning assistance to the MEF G-4 to designate MSRs and establish control measures to support the concept of operations.
- Develops highway regulation plans.
- Coordinates unit movement requirements with the FMCC.
- Provides transportation route overlays and traffic circulation plans (TCPs) to support MEF operation plans (OPLANs).
- Coordinates with the MEF G-2, G-3, engineer, and military police (MPs) for route classification and selection.
- Coordinates placement of MCTs.
- Collects, processes, and distributes information on MSR status.
- Plans, routes, schedules, and manages traffic according to command priorities.
- Issues convoy clearance for approved movements.
- Provides instruction for diversion or rerouting based upon the condition of MSRs, enemy activity, or congestion.
- Coordinates large unit movement tables with other movements and maneuvers.
- Coordinates enforcement of highway regulation plans with the MPs.
- Places MCTs at key transportation nodes and other critical locations on MSRs to expedite surface movements.

2004. Unit Movement Control Center

Every deploying unit down to battalion, squadron, and separate company level activates a UMCC when needed. The UMCC ensures that units are prepared for embarkation, directs marshaling, coordinates assets, identifies additional support requirements, and, as directed by the LMCC, coordinates

the movement of forces to aerial and/or seaports of embarkation. UMCCs may consist of only a single individual.

2005. Movement Control Team

MCTs expedite, coordinate, and support movement control and transportation operations. They are task organized on the basis of mission, enemy, terrain and weather, troops and support available, and time (METT-T). They are normally located at sites such as ports and airfields, beaches, and key combat service support nodes. MCTs are often assigned geographic areas. MCTs are responsible for scheduling, controlling, and coordinating movements within their assigned area or site. These teams may also be tasked with providing sustainment, messing, and maintenance support for units conducting movement.

Part III

Movement Control Planning

Transportation planning, like all Marine Corps planning, depends on input from the commander through out the planning process. The commander, relying on his experience and training, drives the planning process. Therefore, a clear articulation of priorities by the commander is essential. These priorities guide the regulation of all movements. Therefore, transportation planners must exercise discipline when planning the use of transportation assets. The exercise of discipline ensures meeting the commander's priorities. When planning movements, commanders and movement control planners must not validate, approve, or start any move if a terminal or mode in the transportation system cannot meet the requirement.

3001. Planning Steps

The transportation planning process is the same regardless of mode, distance, or locale. The operational commander provides his requirements and establishes priorities based on his concept of operations. Having determined movement requirements, the transportation planner sequences requirements in the following order:

- Start with desired arrival time/required delivery date (RDD) at destination.
- Select mode of transportation.
- Determine load/pickup points, intermediate/transfer points (as required), and off-load/drop points.
- Apply time-distance factors.
- Reconcile conflicting requirements for limited transportation assets (including material handling equipment (MHE)) and support facilities.
- Test movement plan for feasibility.

The movement program is used to preplan both known and anticipated transportation requirements. During the planning process, movement planners allocate available transportation resources to support requirements based on the commander's priorities. The movement program supports the commander's priorities by establishing what requirements can be resourced given available transportation assets, units, and infrastructure. It also relies heavily on the accuracy of data provided by supported units. Movement planners must be flexible because requirements often change based on changes in priority, unit locations, asset availability, and conditions of the LOCs. The LMCC must also be resourced with sufficient MCTs and communications equipment to provide adequate movement control and operational flexibility. The movement control plan serves as authorization to commit transportation assets. It authorizes the MCAs to issue convoy clearances, direct mode operators to furnish assets, and alert receiving units to accept programmed shipments so that they can unload transportation assets promptly. There are six basic steps used to develop a movement program.

a. Assessing the Situation

The distribution plan is a complete logistics picture that shows the locations of the entire logistics infrastructure. It is the tool by which planners know where support should normally flow and where it may be diverted as operational needs dictate. The distribution plan constantly evolves as the theater develops. The distribution plan delineates throughput and internal transportation requirements directly affecting the coordination and preparation of movement programs.

Movement planners use the distribution plan to develop the transportation network. The network consists of the complete system of routes pertaining to all modes of transportation available in the theater. Movement planners study intelligence and engineer information on the AO to determine the capabilities of transportation networks. They also analyze the enemy situation to determine existing or potential threats to movement. Concurrently, they determine the suitability and feasibility of moving supplies and personnel over those transportation networks. Based on these studies, movement planners recommend locations for transportation units and modes to make full use of the transportation networks.

Movement planners also coordinate with shippers and receivers to determine their capability to receive, handle, and load by various transportation modes.

This capability is based on the availability of MHE, cargo handling equipment (CHE), ramps, labor, storage capacity, and other factors that affect transportation services. This information is necessary to efficiently schedule transportation and prevent congestion. An effective movement program is vital for successful support of combat operations. Therefore, supported units must provide accurate data when developing transportation requirements and inform movement planners of current and projected operating sites.

b. Determining Requirements

Having accurate requirements is the key to developing an effective movement control plan. Forecasts must be submitted far enough in advance for the transportation and supply systems to adjust their resources to carry out the program. Movement planners use planning periods for forecasting requirements. The availability of an integrated information system that integrates movement and supply information increases the accuracy of forecasts. It also allows for more accurate movement programming. Materiel movement requirements are developed and grouped in terms of classes of supply, estimated weight and cube, RDD, origin, and destination. Special handling requirements such as refrigerated cargo, hazardous cargo, and controlled/sensitive cargo should also be identified. Major subordinate commands must provide their movement requirements that exceed organic transportation capability for inclusion in the movement program. Personnel movement estimates can be grouped by category such as troops, civilians, patients, or prisoners of war.

c. Determining Capabilities

Movement planners at each command level determine the capabilities of the transportation mode operators in their AO. They obtain from mode operators the characteristics and capabilities of the following:

- Number of transportation units and their equipment available to support common-user movement requirements.
- Total number of HN transportation assets allocated to support common-user movement requirements (include rail, inland waterways, and coastal shipping if available and feasible).
- Number of third country and U.S.-contracted assets.
- Reception, material handling, and in-transit storage capabilities.

- Communication capabilities (MCT to MCT, MCT to LMCC, etc.).

Movement planners should realize that requirements normally exceed allocated transport. Movement planners must also update capabilities with changes as they occur and adjust movement programs accordingly. When developing motor transport capabilities, planners should use planning factors such as the type of equipment, availability of MHE and CHE, weather, and terrain.

d. Balancing Requirements Against Capabilities

Balancing requirements against capabilities determines whether the available modes of transportation will support movement requirements. As a result of this step, movement planners determine the workload for each mode and segment of the transportation network. Movement planners must assign requirements against all capabilities in a logical manner. They must not only consider the capabilities but also the total transportation network, tactical situation, priority of movement, and risk of failure. For example, if a critical shipment must move into an area that is accessible by multiple road routes, but only one rail route, it would be wise to program the movement by motor transport. The rail segment could be used for less critical requirements.

Planners must consider the following workload requirements:

- Direct shipments.
- Multistops.
- Balancing requirements against capabilities.
- Retrograde.
- Intermodal shipments.

e. Determining Shortfalls, Critical Points, and Solutions

Planners must identify potential shortfalls in transportation assets, and prioritize movements according to the commander's guidance and the importance of the movement of the unit or cargo. They must also identify critical points where restrictions could slow or halt movement. Critical points include the following:

- Facilities.
- Terminals.

- Ports.
- Airheads.
- Railheads.
- Bridges.
- Tunnels.
- Highway/traffic choke points.
- Cargo transfer points.

Congested critical points will limit the efficiency and effectiveness of the entire transportation network. After identifying the critical points, planners determine alternative plans or control measures that could reduce or eliminate the risk of congestion. The LMCC will place MCTs on the ground where problems are expected so they can respond before delays congest the system. They should also coordinate engineer, MP, and low-altitude air defense support where necessary

f. Plan Transition

Operation plans, orders, and estimates contain essential information that must be read and understood. Movement planners must understand the concept of operation to effectively support the commander's intent while executing highway regulation. These plans also contain information such as geographic boundaries, task organization, priorities, and location of major supply activities. Commanders and their planning staffs must ensure movement control plans or orders be distributed rapidly to all units and agencies that may be affected. Confirmation briefs and rehearsals are valuable techniques for ensuring that the plan or order is understandable and feasible.

3002. Highway Regulation Planning

The objectives of highway regulation planning are sustained movements in keeping with the commander's priorities and the most effective and efficient uses of road networks. Planning is done in a logical sequence and results in publication of the highway regulation plan and the TCP. See Appendix B, Highway Regulation Plan, for more information.

The highway regulation plan is included in the operation plan or order. The written plan will describe the information contained on the overlay and specify the control measures that apply to each MSR or critical segments of the MSRs. Control measures should be coordinated with phases of the operation, if phases are used. These should also be coordinated with the G-3. Special attention should be paid to reserved routes that support large unit movements.

The following steps are used in developing highway regulation and TCPs.

a. Selection of Main Supply Routes

MSRs must be able to support the volume of traffic necessary to meet planned and anticipated movement requirements. Primary and alternate MSRs must be selected. The forward movement of maneuver forces should be anticipated and MSRs extended well beyond the current area of operations. The G-3 is responsible for terrain management and must approve MSRs before movement planners can develop a highway regulation plan.

b. Determining Critical Points

Critical points are areas of interest to movement planners. Plans do not list every critical point but only the most important ones that may affect traffic flow. In addition to the critical points listed above in 3001e, critical points might include the following:

- Roadway structures or features that limit road width, overhead clearance, or vehicle load class. These include washouts, overpasses, bridges, and degraded road surface conditions.
- Crossroads at grade level.
- Bridges, overpasses, underpasses, ferries, fords, constrictions, and sharp turns under a 30-meter (100-foot) radius.

c. Establishing Control Measures For Each Route

Control measures should be based on engineer route classifications, planned and anticipated traffic volume, METT-T, and critical points. Planners must also consider the capabilities of movement control and traffic control units to enforce the control measures. Control measures may change based on the conduct of operations. Movement planners must ensure that changes are

incorporated into a fragmentary order or are otherwise disseminated quickly. Below are the five control measures:

- **Open Route**. This is the least restrictive control measure. Any unit may use the route without a convoy clearance. Minimum control is exercised.
- **Supervised Route**. The LMCC/UMCC will specify the size of convoys, the type of traffic, or characteristics of vehicles that require a convoy clearance to use the route. Limited control is exercised.
- **Dispatch Route**. A convoy number is required to use this route regardless of the number or types of vehicles. A dispatch route will normally be designated when traffic volume is expected to exceed capacity or when the route is critical to operations and priority of use must be strictly enforced. Full control is exercised.
- **Reserved Route**. The route is reserved for the exclusive use of a particular unit(s) or type of traffic and no other units/traffic may use the route. Reserved routes may be identified for large unit movements. Examples are when a maneuver unit must pass another forward, when reserve formations are committed, or when units are withdrawn for reconstitution.
- **Prohibited Route**. The route is closed and no unit/traffic may use the route. A route may be prohibited due to washouts, destroyed bridges, maintenance, or construction work. It may be prohibited for only short periods, such as the time necessary to do repairs.

d. Establishing Checkpoints to Segment the Main Supply Route

Segmenting the MSR facilitates highway regulation and traffic control planning and execution. Checkpoints (CPs) should be established at the following:

- Major crossroads.
- Locations where road conditions change.
- Major supply or service areas.
- Borders and unit boundaries.
- Assembly areas.
- Critical points, as appropriate.

CPs are predetermined points on the MSR that are used as a means of regulating and controlling movement. When requesting movement clearance units use CPs to identify their start point (SP), release point (RP), and en route CPs. CPs enable quick dissemination of information during execution such as a point where traffic will be rerouted. CPs are also used when describing the MSR in the highway regulation plan. Some examples are as follows:

- "MSR Spear is a paved, all weather road from CP 22 to CP 34."
- "From CP 34 to the division rear boundary the MSR is an improved four-land fair weather road."
- "The route is classified as an open route from CP 22 to CP 34."
- "It is a supervised route from CP 34 to CP 8 at the division rear boundary. Convoys of eight or more vehicles, tracked vehicles, or vehicles that cannot maintain a 30 kph march rate require a convoy clearance on that segment."
- "The most restrictive route feature is at CP 35, a bridge with a military load classification of 30. Vehicles with a military load classification greater than 30 must use the ford at NJ334098. Signs for the ford are posted."

Planners should identify sufficient CPs to adequately exercise control, but no more than they have the capability to manage when the plan is executed. This requires careful balancing so that excessive CPs do not impede execution.

e. Preparing a Traffic Circulation Plan

The TCP overlay will show all MSRs, CPs, and highway regulation points. It will also include route names, direction of travel, boundaries, and principal supply activities. It will reflect any restrictive route features, critical points, and convoy support centers. It may include traffic control points. See Appendix C, Traffic Circulation and Control Overlay, for more information.

f. Determining Reporting Requirement

Planners should identify any requirements for movement control reporting. These requirements are for units using the MSR if such reporting is necessary.

g. Staffing and Coordinating the Plan

Planners should recommend to the MCA points where traffic control will be required. Additionally, they may recommend locations and priorities for engineer repair and upgrade efforts to the G-4 and Engineer Officer.

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Part IV

Routing and Scheduling

The processes of routing and scheduling are critical to the development and execution of effective and efficient movement control. Failure to ensure accurate and complete routing and scheduling will result in a transportation system that will not support the concept of operations and may lead to the failure of the unit to accomplish its mission.

4001. Routing

Routing is the process of coordinating or directing movements on MSRs or ASRs. When routing traffic, movement planners should consider the three fundamentals and four principles that govern routing.

a. Fundamentals of Routing

The three fundamentals that govern routing are balance, separation, and distribution—

- **Balance**. This process matches vehicle characteristics with route characteristics. Balance ensures that traffic never routinely exceeds the most limiting feature of a route. It considers the military load classification of the vehicles, bridges, and the route. Balancing also identifies requirements for upgrading routes or ordering caution crossings for certain bridges. Route characteristics are obtained during the planning process.
- **Separation**. This process allocates road space for movements to ensure that movements do not conflict. The goal of separation is to prevent congestion on regulated routes. Planners must not allocate road space or time blocks to more than one movement requirement.
- **Distribution**. This process allocates as many routes as possible to reduce the potential for congestion and prevent deterioration of road surfaces. Distribution also promotes passive defense by distributing and separating traffic.

b. Principles of Routing

The four principles that govern routing are—

- Assign highest priority traffic to routes that provide the minimum time-distance.
- Consider the sustained capabilities of roads and bridges when assigning movements.
- Separate motor movements from pedestrian movements.
- Separate civilian traffic (vehicular or pedestrian) from military movements.

4002. Scheduling

Scheduling is the process of coordinating times for road movements. It involves receiving movement requests, managing requests, and issuing convoy clearances. Scheduling is necessary for the following—

- Applying command priorities.
- Applying the fundamentals of routing to reduce delays, conflicts, and congestion.
- Conducting detailed planning for large unit or high-priority movements.
- Reserving time for route maintenance.
- Rerouting or holding movements based on changes in priority or the tactical situation.

a. Fundamentals of Scheduling

The following fundamentals apply in scheduling movements—

- Movements on routes requiring movement clearance must be scheduled.
- Movements that cross movement control boundaries must be scheduled, coordinated, and inbound cleared by the movement control organization responsible for the area where the movement originates to the movement control organization where the movement terminates.
- Large unit movements should be scheduled.

- Movements in one direction on routes that require a convoy clearance are treated as a single movement regardless of the distance or time involved. Each movement retains the same convoy clearance number to destination.
- Schedules—and changes to schedules due to immediate movement requirements—are provided to the MCTs and the MPs to execute highway regulation and provide traffic control. The method of scheduling road movements will be based on the control measures specified for the route.

b. Scheduling Methods

The four types of scheduling methods are infiltration, route, location, and column. These methods (from the least restrictive to the most restrictive) are described below—

- **Infiltration Schedule**. This schedule is a rate of dispatch assigned to units for specific routes and time blocks to achieve an average traffic flow that is within the capacity of the route. By assigning rates of dispatch to different units that need to use the same route, average traffic flow can be held within desired limits. An infiltration schedule may be used for open or supervised routes.
- **Route Schedule**. This schedule is a flexible scheduling method. It apportions blocks of time on MSRs to units, types of movements, phases of the operation, or for route maintenance. A route schedule may be used for supervised, dispatch, or reserved routes.
- **Location Schedule**. This schedule is more restrictive than an infiltration or route schedule. It assigns arrive and clear times to different units needing to use the same entry point onto MSRs. The location will normally be a CP. For example, at a particular CP, unit "A" may be scheduled to arrive at 1000 and to clear at 1015, unit "B" to arrive at 1020 and to clear at 1030, and so on. A location schedule may be used for supervised or dispatch routes.
- **Column Schedule**. This schedule is the most restrictive scheduling method. It specifies arrive and clear times at CPs along an entire route. It may be based on the requestor's movement request or movement table or on movement tables issued by the movement control organization. Based upon the extent of control required, a column schedule can provide the most effective Highway Regulation because it provides in-transit times to reach CPs and helps the

pacesetter maintain the prescribed rate of march. It may be used for supervised, dispatch, or reserved routes. It should also be used when congestion is anticipated.

Part V

Transportation Request Procedures

Movement managers, through mode selection and transportation request procedures in a theater of operations, are key to the support of transportation requirements. They are primarily responsible for prioritizing requirements and selecting the mode most appropriate to satisfy the requirement. The MCA's (LMCC/UMCC) responsibilities follow below.

5001. Origin Procedures

On receipt of a transportation request, the MCA ensures that the request is complete and accurate. If there are any changes made to the movement requirement such as change of locations, quantity of materiel, or priority, the MCA revalidates the programmed mode before committing a mode operator. For unprogrammed movements, the LMCC will select the mode and commit a mode operator.

5002. Mode Considerations

The MCA plans to commit all available transportation modes to fulfill known requirements. Assets should not be reserved in anticipation of unforeseen requirements. The MCA should meet requirements as they occur by committing transportation mode operators according to command priorities, selecting the most efficient and effective mode, and planning to meet the RDD.

5003. Mode Selection

The MCA must consider many other factors in selecting a mode. These factors include the following:

- **Service Considerations**. Provide service according to need based on command priorities.
- **Security Considerations**. Consider security requirements for shipments involving hazardous, classified cargo, ammunition, or other sensitive cargo.
- **Political Considerations**. Coordinate with the CAO to determine if there are any political sensitivities to materiel being shipped. This may require movement at night, by air, or by any other means to safeguard sensitive/classified cargo.
- **Tactical Considerations**. Coordinate with the requesting unit to determine potential changes in pickup or delivery locations.
- **Highway Considerations**. Rerouting may be required if there are changes to route classifications or the distribution pattern.
- **Rail Considerations**. Use is limited to lines that support supply activities or where transloading can be accomplished with MHE, personnel, and trucks.
- **Air Considerations**. Use is limited to aircraft allocated for combat service support air movement operations or approved requests.
- **Water Considerations**. Use is limited to the availability of barges or boats, cargo transfer units and equipment, and channels capable of accommodating the types of craft available.
- **Host Nation Assets**. Use is limited to those modes and assets provided by the host country. The G-5 or unit having a HNS coordinating missions coordinates HNS.

5004. Transportation Movement Request Number

The transportation movement request number (TMR) is a unique alphanumeric code used to track movement along a MSR. The TMR specifies and authorizes movement or represents use of a transportation asset as directed through movement control channels.

5005. Mode Operator

The LMCC commits a mode operator to conduct a mission. Commitments will flow through predetermined channels developed between the movement control headquarters (LMCC/UMCC) and the mode operating HQ. If a TMR is required, the mode operator will submit a movement

request for convoy clearance to its supporting MCA. If mode operators can no longer support the transportation request for any reason, they must notify the MCA immediately. The MCA will either attempt to establish an alternate delivery date that satisfies the consignee, select another mode, request HN assets, delay lower priority shipments, or request assistance from its headquarters.

5006. Report of Shipment

The MCA tracks status of movement through its assigned mode operator. The MCA notifies adjacent units if a convoy is to cross a unit boundary to facilitate transfer of convoy control from one MCA to another.

5007. Customer Receives Cargo

The customer notifies the destination servicing MCA when it receives the shipment. The MCA closes out the TMR. If the shipment required positive inbound clearance, the destination MCA will forward the receipt notification to the origin MCA for final reconciliation. Supply activities or customers may or may not have reliable communications with their servicing MCA. If this is the case, the mode operator will report shipment delivery.

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Part VI

Joint Movement Control

In a joint environment, regulation of transportation assets and LOCs will prevent congestion and enforce priorities. Regulation of LOC movements is critical. This is always important when U.S. forces must share available airfields, roads, rail lines, water terminals, and inland waterways with allied forces and the HN. The geographic combatant commander has a wide range of options for performing movement control. He may direct subordinate joint force and Service component commanders to perform their own movement control. He may establish a Joint Transportation Board (JTB) or a JMC, or both.

6001. Joint Movement Control Organizations

To ensure a fully integrated and responsive transportation system, the combatant commander normally assigns responsibility for theater transportation movement control to a single joint agency. The combatant commander's logistics staff may form the nucleus of a movement control organization, but to properly execute a theater movement control mission, an additional predesignated, fully trained joint organization is usually required. Ideally, such an organization would be identified as a force deployment option in an OPLAN/operation order and be established early in the theater to coordinate arrival, theater expansion, and operations movement planning and execution.

a. Joint Movement Control Center

If a JMC is established by the geographic combatant commander, it coordinates the employment of all means of theater transportation (including that provided by allies or HNs) to support the concept of operations. The JMC is also the single coordinator of strategic movements for the combatant commander with United States Transportation Command (USTRANSCOM). In addition, it oversees the execution of intra-theater

transportation priorities. The JMC is responsible for planning movement operations and for monitoring the overall performance of the theater transportation system. The JMC conducts cyclic reviews of transportation apportionment decisions and acts on emergency transportation requests. When there is no theater JTB, the JMC is the primary advisor to the geographic combatant commander in the transportation apportionment process. The JMC identifies the difference between forecasted requirements and current capabilities of all modes to assist in the planning process. It expedites action and coordination for immediate movement requirements to ensure effective and efficient use of transportation resources.

The JMC is organized functionally and designed with a peacetime nucleus. It is designed for expansion in proportion to the size of the force. An Administrative Section, Plans and Programs Division, and Operations Division are normal staff elements of the JMC. The Operations Division may be further subdivided into Airlift, Sealift, and Inland Surface Movement Branches. The JMC staff elements develop a system of reports to assist in managing the theater transportation program. Figure 6-1 shows a suggested organization.

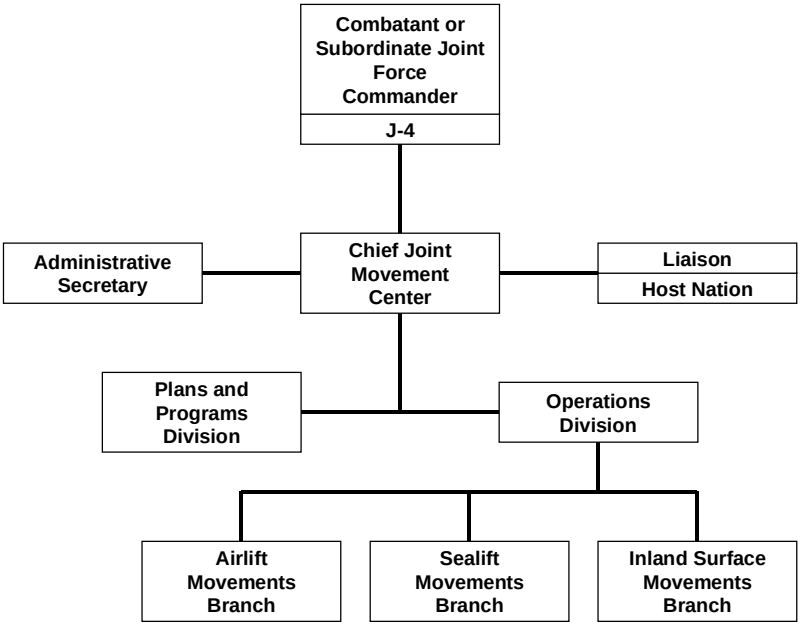

Figure 6-1. Suggested joint movement center organization.

b. Theater Joint Transportation Board

The geographic combatant commander may establish a theater JTB to review and deconflict policies, priorities, and transportation apportionments beyond the authority of a JMC. This JTB consists of representatives from the Service components, MCAs, and the combatant command J-3 (Operations), J-4 (Logistics), and J-5 (Plans). The combatant commander determines who should chair the theater JTB; normally this would be the J-4. If the theater JTB is unable to support the combatant commander's concept of operations with assigned assets, requests should be made, via the supporting combatant commander, to the Chairman of the Joint Chiefs of Staff for additional transportation assets.

6002. Theater Movement Control System

The MCA plans, allocates, coordinates and deconflicts transportation. The MCA also establishes and operates an in-transit visibility system to assist in tracking theater movements of units, personnel, unit equipment, and materiel. The requirements of a theater movement control system are shown in figure 6-2.

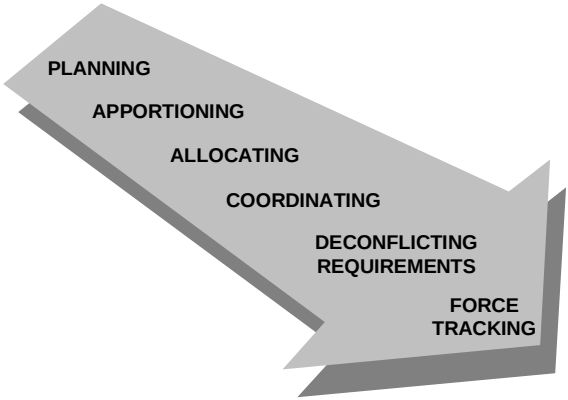

Figure 6-2. Requirements of a theater movement control system.

a. Planning

The JMC serves as the primary advisor through the J-4 to the combatant commander on all matters pertaining to the theater transportation support

structure. The JMC develops the theater movement plan that supports the combatant commander's priorities and concept of operation. The JMC develops this plan while considering theater cargo throughput capabilities (including in-depth analysis of airfield, seaports, and surface transportation routes), the time-phased force and deployment data, apportionment and allocation of transportation resources, and resource protection requirements. The plan must mesh incoming strategic movements with theater reception and onward movement operations.

b. Apportioning

Theater level transportation apportionments, usually expressed in percentages and developed in cycles, support the combatant commander's campaign and operation plans. Transportation apportionment decisions must consider the joint force mission, resources available, threat, and geography of the area of responsibility (AOR). The components use the transportation apportionment decision for transportation allocation and employment.

c. Allocating

Allocating is the assignment of specific transportation resources against specific movement missions. Components normally express transportation allocations as sorties by type of aircraft, gross tonnages, number of vehicles, or other appropriate terms.

d. Coordinating

The JMC coordinates all common-user theater air, land, and sea transportation. The JMC initially coordinates common-user transportation through the movement plan. The JMC monitors the transportation system, analyzes movement performance, and prepares adjustments. The JMC also coordinates the accomplishment of unfulfilled requirements forwarded by component control elements. The JMC approves all unit surface movements that use common-user assets and MSRs.

e. Deconflicting Requirements

The JMC deconflicts theater transportation requirements. Deconflicting requirements involves establishing and managing the transportation request process. It includes validating requests and tasking appropriate transportation assets. Those transportation requirements that cannot be deconflicted by the JMC are forwarded to the JTB for resolution.

f. Force Tracking

The JMC provides the geographic combatant commander the ability to locate units that are using common-user transport within the theater. The JMC can monitor the inland surface movement of forces during theater movements.

6003. Joint Transportation Request Process

The JMC establishes the location and provides the communications facilities for nodes in the transportation system. It also promulgates tasking procedures, cycles, and deadlines. The routine request process for all modes of transportation flows through Service component logistic channels. The components validate each request and forward it to the JMC.

a. Validation

Validation includes verification of the requirement, review of the threat levels or threat assessments, and determination of available and feasible mode of movement. The validator considers competing transportation requirements and the combatant commander's transportation priorities.

b. Surface, Sealift, and Inland Waterway Transportation Requests

The geographic combatant commander usually delegates execution of this portion of the movement plan to the Army component commander. However, specific responsibilities may vary in theaters where both Army and Marine Corps forces exist in large numbers. For example, it is normal to delegate the responsibility for coordinating MSR traffic to the component that has primary use of the route.

The Army component establishes transportation movement regions. Movement control centers (MCCs) and/or MCT are in control of movement regions to manage surface and inland waterway transportation. The number of MCC/MCT varies depending on the volume and complexity of movements. The size of a region depends on its critical areas and geographic boundaries. MCC/MCTs act on requests received from regional users. They task rail, water, or motor transport elements. They are responsible for controlling and supervising all movements

through their regions. They also advise users and serve as an interface with local HN operators. The Army component validates sealift requests in coordination with major subordinate commands and Military Traffic Management Command forward elements.

c. Airlift Request Process

A detailed description of airlift request procedures is found in Chapter III, Joint Pub 3-17, *Joint Tactics, Techniques, and Procedures for Theater Airlift Operations.* When organic or supporting surface or sea transportation is inappropriate or not available, the Service component validating authority may submit a request for airlift to the JMC. The JMC validates component requests and sends them to the air operations center (AOC) or joint air operations center.

Per Joint Pub 3-17, there are three basic types of airlift requests:

- Planned airlift requests when requirements are known or projected in advance.
- Immediate airlift requests when requirements are identified too late for the normal tasking cycle.
- Emergency airlift requests for short notice air movement requirements, usually pressing tactical requirements.

6004. Other Component Movement Capabilities and Organization

The geographic combatant command movement control plan is key to a sound movement control system. The plan should integrate the transportation capabilities of the component commands and produce a movement control system with centralized planning and decentralized execution. The following paragraphs describe the transportation and movement control capabilities of each joint force component.

a. Army

The Army component usually provides common-user land and inland waterway transport. They also furnish water terminal operations and, when necessary, logistics over-the-shore (LOTS) operations. They provide common-user land transport through the MCA of the Theater Support

Command (TSC), corps movement control center, and division transportation office (DTO). Field Manual 55-10, *Movement Control*, contains additional information on Army movement control in a theater of operations.

- **Movement Control Agencies**. The Army executes theater movement control through a MCA with subordinate movement control battalions. The MCA operates under the C2 of the TSC. The TSC positions movement control elements throughout the theater. They also provide movement control through movement regulating teams for such operations as LOTS and commercial carrier support. The MCA coordinates and monitors all shipments in the theater to the final destination and controls theater MSRs.
- **Contract Supervision Teams**. The Army component negotiates and awards contracts for the use of commercial carriers within a HN. To manage these elements, the Army places contract supervision teams in the theater.
- **Movement Regulating Teams**. The Army component establishes movement regulating teams to monitor and control traffic on theater Army and corps road networks.
- **Movement Control Center**. The Army component will normally establish a MCC to manage movements and transportation assets within a corps' AO. It positions movement control elements throughout the corps' AO to provide support.
- **Division Transportation Office**. Each Army division has an organic DTO. The DTO is responsible for movement control within the division.
- **Logistics Over-The-Shore Operations**. LOTS provides the geographic combatant commander a limited seaport or over-the-shore capability where port facilities are damaged or insufficient for arriving sealift. The Army uses truck, helicopter, rail, watercraft, terminal service, and cargo transfer units to perform this mission. The Navy and/or Marine Corps components can operate in concert with Army units in joint logistics over-the-shore operations.

b. Air Force

The Air Force component provides theater common-user airlift. The geographic combatant commander exercises combatant command (command authority) over all theater-assigned airlift forces through the Air Force

component commander, who exercises operational control (OPCON) through the component airlift staff. The Commander in Chief USTRANSCOM exercises combatant command (command authority) of assigned airlift forces. The commander, Air Mobility Command (AMC), exercises OPCON of USTRANSCOM assigned airlift assets through the tanker/airlift control center. The exception is the Commander, Air Combat Command, who exercises OPCON of C-130s. OPCON of attached augmentation airlift forces should be accomplished under the command authority guidelines provided in Joint Pub 0-2, *Unified Action Armed Forces (UNAAF)*.

- **Director of Mobility Forces**. The Director of Mobility Forces (DIRMOBFOR) will normally be a senior officer who is familiar with the AOR or joint operations area (JOA) and possesses an extensive background in airlift operations. When established, the DIRMOBFOR serves as the designated agent of the Air Force component commander or joint force air component commander, if designated, for all airlift issues in the AOR or JOA and for other duties as directed. The DIRMOBFOR exercises coordinating authority between the airlift coordination cell, the air mobility element, the tanker airlift control center, the JMC, and the AOC to expedite the resolution of airlift problems.
- **Air Mobility Element**. The air mobility element is an extension of the AMC tanker/airlift control center deployed to a theater when requested by the geographic combatant commander. It coordinates strategic airlift operations with the theater airlift management system and collocates with the air operations center whenever possible.

c. Navy

The Navy component, through Military Sealift Command, provides common-user sealift to the theater. The Navy component, in concert with Army units, can provide the combatant commander with over-the-shore discharge and cargo transfer capabilities, where port facilities are not available or inadequate. Navy cargo handling battalion and Navy Cargo Handling and Port Group are Navy component organizations that conduct limited common-user port operations. The Navy component performs its movement control operations through the Navy component command, naval advanced logistic support site (ALSS), naval forward logistic site (FLS), or a designated representative. The ALSS and FLS provide logistic support, to include movement management, to theater naval forces during major

contingency and wartime periods. They coordinate Navy land transportation requirements with Army movement control organizations or the JMC. The Navy component commander submits requirements for airlift to the JMC.

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Appendix A

Movement Control Planning Factors

Movements are measured by calculating how long it takes to move a given distance. The three methods of measurement are speed, pace, and rate of march. They are defined as follows:

- **Speed**. Speed is the actual rate at which a vehicle is moving at a given time as shown on the speedometer. It is expressed as KPH or MPH.
- **Pace**. Pace is the regulated speed of a convoy or an element as set by a lead vehicle, the pacesetter. It is constantly adjusted to suit road, terrain, and weather conditions. Pace is also expressed as KPH or MPH.
- **Rate of March**. Rate of march is the average number of kilometers traveled in a specific time period. It includes short periodic halts and short delays, but does not include long halts, such as those for eating meals or for overnight stops. It is expressed in KMH or MPH. Rate of march is used in movement calculations.

A1. Time-Distance Factors

Time and distance factors are used to perform a wide range of calculations for planning highway movements. They can be used to develop movement tables and to conduct expedient planning and calculating to deconflict movement requests. See figure 5.

a. Distance Factors

Distance factors are expressed in kilometers or meters. The following terms are used to describe distance factors:

- **Length**. The length of any column or element of a column is the length of a roadway that the column occupies. It is measured from the

front bumper of the lead vehicle to the rear bumper of the trail vehicle and includes all gaps inside the column.

- **Road Space**. Road space is the length of a column, plus any space (safety factor) added to the length to prevent conflict with preceding or succeeding traffic.
- **Gap**. Gap is the space between vehicles, march units, serials, and columns. Gap is measured from the trail vehicle of one element to the lead vehicle of the following element. The gap between vehicles is normally expressed in meters. The gap between march elements is normally expressed in kilometers.
- **Lead**. Lead is the linear spacing between the heads of elements in a convoy or between heads of successive vehicles, march units, serials, or columns.
- **Road Distance**. Road distance is the distance from point to point on a route, normally, expressed in kilometers.
- **Road Clearance Distance**. Road clearance distance is the distance that the head of a column must travel for the entire column to clear the RP or any point along the route. Road clearance distance equals the column's length or road space plus road distance.

b. Time Factors

Time is expressed in hours or minutes. The following terms are used to describe time factors:

- **Pass Time**. Pass time (or time length) is the time required for a column or its elements to pass a given point on a route.
- **Time Space**. Time space is the time required for a column or its elements to pass any given point on a route plus any additional time (safety factor) added to the pass time.
- **Time Gap**. Time gap is the time measured between vehicles, march units, serials, or columns as they pass a given point. It is measured from the trail vehicle of one element to the lead vehicle of the following element.
- **Time Lead**. Time lead is the time measured between individual vehicles or elements of a column, measured from head to head, as they pass a given point.
- **Time Distance**. Time distance is the time required to move from one point to another at a given rate of march. It is the time required for the head of a column or any single vehicle of a column to move from one point to another at a given rate of march.

- **Road Clearance Time**. Road clearance time is the total time required for a column or one of its elements to travel the road distance and clear a point along the route or the RP. Road clearance time equals the column's pass time or time space plus time distance.

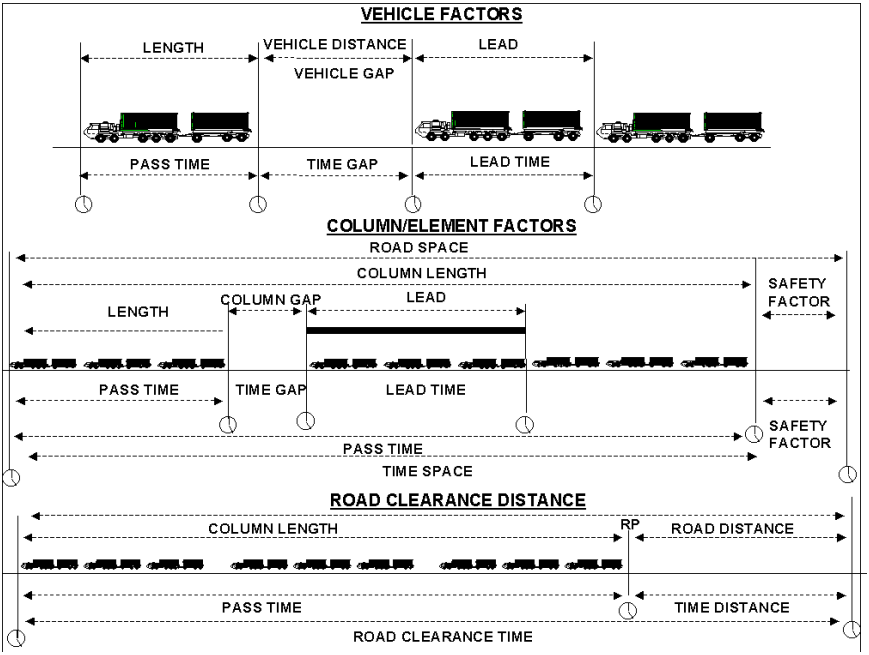

Figure A-1. Time and distance factors.

A2. Distance, Rate, and Time Calculations

Distance, rate, and time factors are used to make scheduling calculations for columns of any size. When two of the three factors are known, the third can be found by using one of the equations shown in figure 6. These factors are determined using the following formulas—

Distance equals rate multiplied by time. If the rate of march is 40 KMPH and time is 4 hours, the distance is 160 kilometers.

$$40 \times 4 = 160$$

Rate equals distance divided by time. If a convoy travels for 5 hours to complete a 190 kilometer trip, its rate of march is 38 KMPH.

$$190 \div 5 = 38$$

Time equals distance divided by rate. If the distance is 210 kilometers and the rate of march is 42 KMPH, the time is 5 hours.

$$210 \div 42 = 5$$

a. Finding an Unknown Factor of Distance, Rate, or Time

Divide a triangle as shown in figure 6. To find an unknown factor, cover it. The uncovered portion of the triangle gives you the formula for finding the unknown.

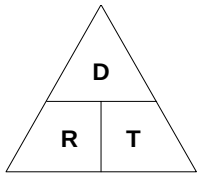

Figure A-2. Time/distance/rate formula aid.

For example, if the distance (D) is unknown, cover it and RT (rate x time) remains. If rate (R) is unknown, covering R leaves $\frac{D}{T}$. Do the same for time (T), and you find $\frac{D}{R}$.

b. Arrive and Clear Time Calculations

Arrive and clear times are not the same as time factors. The time factors measure a quantity of time or distance. Arrive and clear times represent actual time as displayed on a clock. The arrive time is the time the first vehicle in the column will arrive at a SP, CP, or RP. It is derived from the time distance. The clear time is the time the last vehicle in the column will clear that SP, CP, or RP.

c. Calculating Arrive Times

The arrive time at the SP is the same as the SP time. To calculate the arrive time at the first CP, take the distance from the SP to the first CP, divide by the planned rate of march, and multiply by 60 (minutes). Add this time to the arrive time at the SP to determine the arrive time at the first CP.

Example: Distance from SP to first CP: 10 km
March rate: 50 KMIH

Solution: 10 ÷ 50 = .20 hrs x 60 = 12 min

If the arrive time at the SP was 0800, then the arrive time at the first CP would be 0812.

To calculate the arrive time at the second CP, take the distance from the first CP to the second CP, divide by the rate of march, and multiply by 60. Add the amount of time to the arrive time at the first CP to determine the arrive time at the second CP.

Example Distance from first to second CP: 15 km
March rate: 50 KMIH

Solution: 15 ÷ 50 = .30 hrs x 60 = 18 min

If the arrive time at the first CP was 0812, then the arrive time at the second CP would be 0830. Continue this method to calculate the arrive time at succeeding CPs through the RP.

d. Calculating Clear Times

To calculate the clear times at each CP, planner must determine the pass time. Calculating pass time requires four calculations: density, time gaps, road space, and pass time. These four calculations are determined using the following formulas:

Density = 1,000/Vehicle gap + average length of vehicle

Note: Vehicle gap is expressed in meters, representing the gap between vehicles. Average length of vehicle is expressed in meters, representing the average length of the most common vehicle in the column.

Example: If the vehicle gap is 100 meters and the average vehicle length is 18 meters, then—

$$\text{Density} = \frac{1{,}000}{100+18} = \frac{1{,}000}{118} = 8.5 \text{ vehicles per kilometer}$$

Time gaps = [(number of march units – 1) x (march unit time gap)] + [(number of serials - 1) x (serial time gap – march unit time gap)].

Example: If a column has two serials with two march units each and the gap between march units is 5 minutes and the gap between serials is 10 minutes, then—

Time gaps [(4 - 1) x 5) + [(2 - 1) x 5] = [3 x 5] + [1 x 5] = 15 + 5 = 20 minutes

$$\text{Road space} = \frac{\text{number of vehicles}}{\text{density}} + \frac{\text{time gaps} \times \text{rate}}{60 \text{ (minutes)}}$$

Example: number of vehicles = 87
Density = 8.5 per km
Rate = 50 KMH
Time gaps = 20

$$\text{Road space} = \frac{87}{8.5} + \frac{20 \times 50}{60} = 10.2 + 16.8 = 26.9 \text{ km}$$

$$\text{Pass time} = \frac{\text{roadspace} \times 60}{\text{rate}}$$

Example: Continuation from above.

$$\text{Pass time} = \frac{26.9 \times 60}{50} = \frac{1{,}614}{50} = 32.2 \text{ or } 33 \text{ minutes}$$

In this example, the clear time at the SP is 33 minutes after the first vehicle crossed the SP. If the arrival time at the SP is 0800 the clear time at the SP will be 0833. If the arrival time at the first CP is 0812, the clear time at the first CP will be 0845. Use this same method to calculate the arrive and clear times at succeeding CPs to the RP. This movement can be depicted as:

CP	Arrive Time	Clear Time
1	0800	0833
2	0812	0845
3	0830	0930

Table A-1. Example clear and arrive times 1.

The pass time will stay the same throughout the route as long as the march rate and density do not change. If the march rate or density changes, then recalculate the pass time to determine the new clear time.

A3. Rest Halts

The march rate compensates for short halts, but does not include scheduled rest halts. Plan scheduled rest halts during the movement planning process. When planning rest halts, allow time to get vehicles off the road and staged, time to rest, and time to get vehicles back on the road. If you need 10 minutes for a rest halt, then schedule 15 minutes for the halt to ensure time to get vehicles on and off the road.

If a rest halt is scheduled at a CP, the arrive time at the CP does not change. What changes is the clear time at that CP and the arrive and clear times at succeeding CPs. Adjust the clear time by the scheduled halt time. If a rest halt is scheduled between CPs, adjust both the arrive and clear times at the next CP by the scheduled halt time. Continuing, with the previous example, if you plan a 15-minute rest halt between CP 2 and CP 3, you must adjust the times as follows:

CP	Arrive Time	Clear Time
1	0800	0833
2	0812	0845
3	0845	0918

Table A-2. Example clear and arrive times 2.

Note the 15-minute delay in arriving and clearing CP 3. If you planned the rest halt at CP2, your adjustments would be as follows:

CP	Arrive Time	Clear Time
1	0800	0833
2	0812	0900
3	0845	0918

Table A-3. Example clear and arrive times 3.

Note the 15-minute delay in clearing CP 2, arriving at CP 3, and clearing CP3.

The pass time will stay the same throughout the route as long as the march rate and density do not change. If the march rate or density changes, you must recalculate the pass time to determine the new clear time. Follow these guidelines to simplify calculations:

- Prepare and use conversion tables for changing US common distances to metric distances, number of vehicles to time length, and distance to time.
- Standardize variables to reduce calculation time. When possible, use standard march rates and density.

Appendix B

Highway Regulation Plan

The highway regulation plan is used to inform all units operating within the MEF's AO of the policies and procedures governing convoy or oversize/overweight vehicle movements. A highway regulation plan should be developed for all OPLANs or exercises and be included within Annex D (Logistics) of the applicable OPLAN or exercise directive.

It is the responsibility of all organizations with a highway regulation mission to develop highway regulation plans. Responsible organizations include FMCCs, LMCCs, and UMCCs.

MEF movement planners must ensure their policies and procedures comply with any theater transportation requirements. Whenever two or more regulating agencies operate in the same theater of operation, coordination to standardize policies and procedures must be accomplished. Development of the TCP must also be coordinated to ensure mutual use MSRs are given one name throughout the theater to avoid confusion. Movement priority codes and other policies and procedures must be standardized.

The following page has a sample format of the highway regulation plan.

Copy no. ____ of ____ copies
Official Designation of Command
Place of Issue
Date/time group
Message reference number

APPENDIX 4 TO ANNEX D TO OPERATION ORDER OR PLAN (Number) (Operation CODEWORD) ( )
HIGHWAY REGULATION PLAN ( )

( ) REFERENCES: a. Any relevant plans or orders.
b. Required maps and charts.
c. TCP and other relevant documents.

1. ( ) Situation. Include information affecting movement.

2. ( ) Mission. Include provisions of effective highway regulation, reporting, support of operations, and coordination of movement and maneuver. Identify organizations responsible for controlling routes.

3. ( ) Execution

a. ( ) Concept of Movements. Briefly state the highway regulation concept and coordination of movements and maneuver and battlefield circulation control.

b. ( ) Tasks to Subordinate Units

(1) ( ) Units perform route reconnaissance or get information from TCP pertaining to theater route network.

(2) ( ) Units responsible for abiding by all policies and procedures listed in the plan.

c. ( ) Coordinating Instructions. Address coordination of use of MSRs.

(1) ( ) Request Procedures

(a) ( ) Convoy request form or oversize/overweight request form. Put example(s) at appendix. Identify required data (mandatory). Hazardous cargo and oversize/overweight information must be put in remarks. Round trip, use request form with stopover time.

(b) ( ) Submit to. Identify locations units will submit convoy movement requests or oversize/overweight. Telephone procedures/telephone numbers, facsimile, etc.

(c) ( ) Submit when: How many days before movement, emergency procedures, and authorization.

(d) ( ) Convoy movement priorities. Use numbers 1: highest priority and so on. Coordinate with all clearance activities to use same number system.

(e) ( ) Minimum number of vehicles that constitute a convoy.

(f) ( ) Infiltration rules (fewer vehicles than a convoy). Ensure infiltrating vehicles yield to convoys at intersection and do not hinder convoy movement.

(g) ( ) Special movement consideration information must be entered in remarks on the request for movement form.

(2) ( ) Route Utilization Information. Discuss MSR listed in TCP. Explain controlled versus MSR (open).

(a) ( ) MSR listed on TCP is open route any unit can use. No clearance required. First come, first serve. Minimum speed on MSR and any restrictions. Direction of travel.

(b) ( ) Controlled route. Listed in TCP (same as dispatch route). Convoy request must be submitted and a clearance issued prior to movement. Minimum speed for controlled routes and any restrictions. Direction of travel.

(c) ( ) Supervised route. Identify route(s) rules and procedures.

(d) ( ) Prohibited route. Identify which route in TCP or not on TCP is prohibited.

(e) ( ) Reserved route (identify who can use and duration).

(f) ( ) Headlight restrictions if any.

(g) ( ) Hardening of vehicles.

d. ( ) Procedures

(1) ( ) Planning Factors (convoy). Use the following planning factors for convoys.

(a) ( ) Distance between vehicles.

(b) ( ) Time gap between march units/serials.

(c) ( ) Time gap between convoys.

(d) ( ) Oversize/overweight criteria. Procedures to submit request for clearance.

(e) ( ) Vehicles per march unit.

(f) ( ) March units per serial.

(g) ( ) Blackout procedures/light lines.

(h) ( ) Hardening of vehicles.

(i) ( ) Convoy/hazardous cargo marking/flags.

(j) ( ) Delay in meeting SP time procedures.

(2) ( ) Planning Factors (route information). Refer to TCP for location and type routes, halt locations and services, traffic control point locations, critical point locations, and restrictions.

e. ( ) Enforcement. Include command actions that will be taken in the event units do not follow policies and procedures. Stress the requirement

that units must have approved march table/movement order prior to using controlled routes. Identify who will monitor and control movements.

4. ( ) Administration and Logistics. Address any movement-related administrative or logistic requirements.

a. ( ) Provide logistical support request procedures. Rest, refueling, and so forth. The TCP (text version) identifies convoy halt locations, facilities, and services available to include units responsible for providing service.

b. ( ) Maintenance and recovery procedures. Vehicle breakdown procedures.

c. ( ) Medical evacuation procedures.

d. ( ) Halts.

5. ( ) Command and Control

a. ( ) Command. Identify communications reporting locations and procedures with LMCC, MCTs, and MPs.

b. ( ) Signal. Describe reporting requirements, method of communication, and radio frequencies.

Tabs:

A — Traffic Circulation Plan (Map overlay format and written)

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Appendix C

Traffic Circulation and Control Overlay

A TCP may be issued as a separate appendix to Annex D, Logistics. It will also include written position describing location of TCPs, descriptions of MSRs, and any special considerations concerning road conditions.

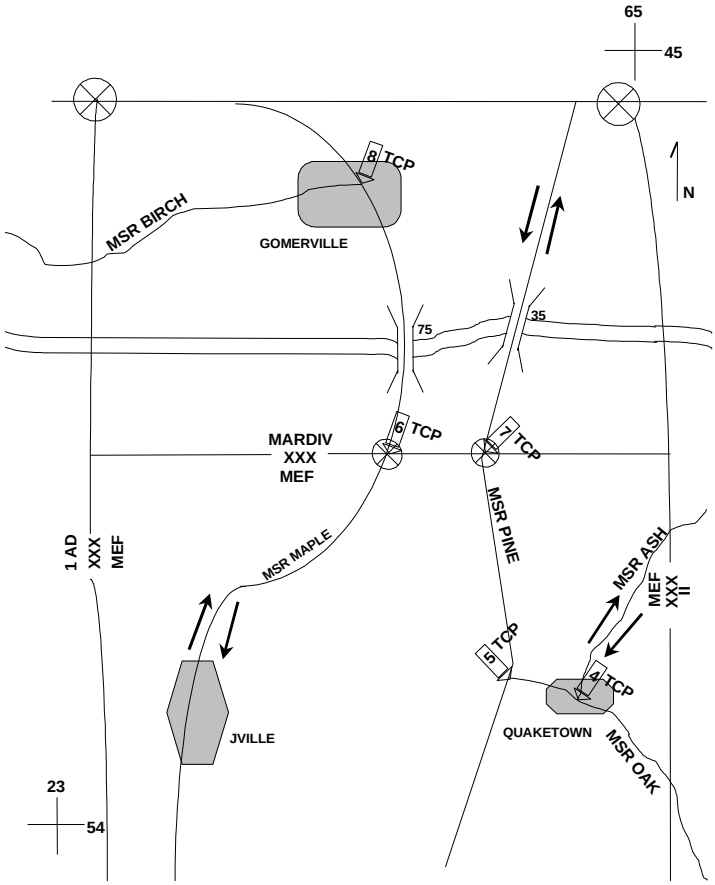

Figure C-1. Sample traffic circulation overlay.

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Appendix D

Glossary

Section I
Acronyms

Note: Acronyms change over time in response to new operational concepts, capabilities, doctrinal changes and other similar developments. The following publications are the sole authoritative sources for official military acronyms:

1. Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*.
2. MCRP 5-12C, *Marine Corps Supplement to the Department of Defense Dictionary of Military and Associated Terms.*

ALSS	naval advanced logistics support site
AMC	Air Mobility Command
AO	area of operations
AOC	air operations center
AOR	area of responsibility
ASR	alternate supply route
C2	command and control
CAO	civil affairs officer
CHE	cargo handling equipment
CP	checkpoint
DIRMOBFOR	Director of Mobility Forces
DTO	division transportation office
FLS	naval forward logistic site
FMCC	force movement control center

FSSG	force service support group
HN	host nation
HNS	host-nation support
JMC	joint movement center
JOA	joint operations area
JTB	Joint Transportation Board
LMCC	logistics movement control center
LOC	line of communications
LOTS	logistics over-the-shore
MCA	movement control agency
MCC	movement control center
MCT	movement control team
MEF	Marine expeditionary force
METT-T	mission, enemy, terrain and weather, troops and support available, and time
MHE	material handling equipment
MP	military police
MSR	main supply route
OPCON	operational control
OPLAN	operation plan
RDD	required delivery date
RP	release point
SP	start point
TCP	traffic circulation plan
TMR	transportation movement request
TSC	Theater Support Command
UMCC	unit movement control center
USTRANSCOM	United States Transportation Command

Section II
Definitions

Note: Definitions of military terms change over time in response to new operational concepts, capabilities, doctrinal changes and other similar developments. The following publications are the sole authoritative sources for official military definitions of military terms:

1. Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*.
2. MCRP 5-12C, *Marine Corps Supplement to the Department of Defense Dictionary of Military and Associated Terms.*

A

Air Mobility Command—The Air Force Component Command of the U.S. Transportation Command. Also called **AMC**. (JP 1-02)

alternate supply route—A route or routes designated within an area of operations to provide for the movement of traffic when main supply routes become disabled or congested. Also called **ASR**. (MCRP 5-12A)

area of operations—An operational area defined by the joint force commander for land and naval forces. Areas of operation do not typically encompass the entire operational area of the joint force commander, but should be large enough for component commanders to accomplish their missions and protect their forces. Also called **AO**. (JP 1-02)

area of responsibility—1. The geographical area associated with a combatant command within which a combatant commander has authority to plan and conduct operations. Also called **AOR**. (JP 1-02)

C

checkpoint—1. A predetermined point on the surface of the Earth used as a means of controlling movement, a registration target for fire adjustment, or reference for location. 4. A place where military police check vehicular or

pedestrian traffic in order to enforce circulation control measures and other laws, orders, and regulations. (JP 1-02)

civil affairs—The activities of a commander that establish, maintain, influence, or exploit relations between military forces and civil authorities, both governmental and nongovernmental, and the civilian populace in a friendly, neutral, or hostile area of operations in order to facilitate military operations and consolidate operational objectives. Civil affairs may include performance by military forces of activities and functions normally the responsibility of local government. These activities may occur prior to, during, or subsequent to other military actions. They may also occur, if directed, in the absence of other military operations. Also called **CA**. (JP 1-02)

command and control—The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission. Also called **C2**. (JP 1-02)

course of action—1. A plan that would accomplish, or is related to, the accomplishment of a mission. 2. The scheme adopted to accomplish a task or mission. It is a product of the Joint Operation Planning and Execution System concept development phase. The supported commander will include a recommended course of action in the commander's estimate. The recommended course of action will include the concept of operations, evaluation of supportability estimates of supporting organizations, and an integrated time-phased data base of combat, combat support, and combat service support forces and sustainment. Refinement of this data base will be contingent on the time available for course of action development. When approved, the course of action becomes the basis for the development of an operation plan or operation order. Also called **COA**. (JP 1-02)

D

Director of mobility forces—Normally a senior officer who is familiar with the area of responsibility or joint operations area and possesses an

extensive background in airlift operations. When established, the director of mobility forces serves as the designated agent for all airlift issues in the area of responsibility or joint operations area, and for other duties as directed. The director of mobility forces exercises coordinating authority between the airlift coordination cell, the air mobility element, the Tanker Airlift Control Center, the joint movement center, and the air operations center in order to expedite the resolution of airlift problems. The director of mobility forces may be sourced from the theater's organizations, United States Transportation Command, or United States Atlantic Command. Also called **DIRMOBFOR**. (JP 1-02)

H

host nation—A nation which receives the forces and/or supplies of allied nations and/or NATO organizations to be located on, to operate in, or to transit through its territory. Also called **HN**. (JP 1-02)

host-nation support—Civil and/or military assistance rendered by a nation to foreign forces within its territory during peacetime, crises or emergencies, or war based on agreements mutually concluded between nations. Also called **HNS**. (JP 1-02)

J

joint movement center—The center established to coordinate the employment of all means of transportation (including that provided by allies or host nations) to support the concept of operations. This coordination is accomplished through establishment of transportation policies within the assigned area of responsibility, consistent with relative urgency of need, port and terminal capabilities, transportation asset availability, and priorities set by a joint force commander. (JP 1-02)

joint operations area—An area of land, sea, and airspace, defined by a geographic combatant commander or subordinate unified commander, in which a joint force commander (normally a joint task force commander) conducts military operations to accomplish a specific mission. Joint operations areas are particularly useful when operations are limited in scope and geographic area or when operations are to be conducted on the boundaries between theaters. Also called **JOA**. (JP 1-02)

Joint Transportation Board—Responsible to the Chairman of Joint Chiefs of Staff, the Joint Transportation Board assures that common-user transportation resources assigned or available to the Department of Defense are allocated as to achieve maximum benefit in meeting Department of Defense objectives. Also called **JTB**. (JP 1-02)

L

line of communications—A route, either land, water, and/or air, which connects an operating military force with a base of operations and along which supplies and military forces move. Also called **LOC**. (JP 1-02)

logistics over-the-shore operations—The loading and unloading of ships with or without the benefit of fixed port facilities, in friendly or nondefended territory, and, in time of war, during phases of theater development in which there is no opposition by the enemy. Or as a means of moving forces closer to tactical assembly areas dependent on threat force capabilities. Also called **LOTS operations**. (JP 1-02)

M

movement control—1. The planning, routing, scheduling, and control of personnel and cargo movements over lines of communications. (JP 1-02)

main supply route—The route or routes designated within an area of operations upon which the bulk of traffic flows in support of military operations. (JP 1-02)

O

operational control—Transferable command authority that may be exercised by commanders at any echelon at or below the level of combatant command. Operational control is inherent in combatant command (command authority). Operational control may be delegated and is the authority to perform those functions of command over subordinate forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction necessary to accomplish the mission. Operational control includes authoritative direction over all aspects of military operations and joint training necessary to

accomplish missions assigned to the command. Operational control should be exercised through the commanders of subordinate organizations. Normally this authority is exercised through subordinate joint force commanders and Service and/or functional component commanders. Operational control normally provides full authority to organize commands and forces and to employ those forces as the commander in operational control considers necessary to accomplish assigned missions. Operational control does not, in and of itself, include authoritative direction for logistics or matters of administration, discipline, internal organization, or unit training. Also called **OPCON**. (JP 1-02)

operation plan—Any plan, except for the Single Integrated Operation Plan, for the conduct of military operations. Plans are prepared by combatant commanders in response to requirements established by the Chairman of the Joint Chiefs of Staff and by commanders of subordinate commands in response to requirements tasked by the establishing unified commander. Operation plans are prepared in either a complete format (OPLAN) or as a concept plan (CONPLAN). The CONPLAN can be published with or without a time-phased force and deployment data (TPFDD) file. a. OPLAN--An operation plan for the conduct of joint operations that can be used as a basis for development of an operation order (OPORD). An OPLAN identifies the forces and supplies required to execute the CINC's Strategic Concept and a movement schedule of these resources to the theater of operations. The forces and supplies are identified in TPFDD files. OPLANs will include all phases of the tasked operation. The plan is prepared with the appropriate annexes, appendixes, and TPFDD files as described in the Joint Operation Planning and Execution System manuals containing planning policies, procedures, and formats. Also called **OPLAN**. (JP 1-02)

R

release point (road)—A well-defined point on a route at which the elements composing a column return under the authority of their respective commanders, each one of these elements continuing its movement towards its own appropriate destination. (JP 1-02)

required delivery date—A date, relative to C-day, when a unit must arrive at its destination and complete offloading to properly support the concept of operations. Also called **RDD**. (JP 1-02)

U

United States Transportation Command—The unified command with the mission to provide strategic air, land, and sea transportation for the Department of Defense, across the range of military operations. Also called **USTRANSCOM**. (JP 1-02)